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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,122	11/18/2003	Tadayoshi Tominaga	03194	2753

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ALEXANDRIA, VA 22314

EXAMINER

MAI, NGOC LAN THI

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/715,122

Applicant(s)

TOMINAGA ET AL.

Examiner

Ngoclan T. Mai

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/18/03.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/18/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaucher et al.
3. Gaucher et al discloses a method for treating parts made of Ti or Ti alloy by heat treating the parts in oxidative atmosphere at a predetermined temperature and time to obtain a non-pulverous surface layer with a thickness sufficient for enabling the parts to rub without seizing, col. 4, lines 20-30. Gaucher et al teaches that heating part at 600 C for more than 12-1/2 hours would result in pulverous layer, while keeping said part at 600 C for less than 3-1/2 hours would give a layer, which is too thin to allow rubbing correctly. Note that by desiring non-pulverous layer Gaucher et al. implies that parts that have low surface roughness but sufficient thickness so that the parts can be rubbed without seizing are preferred. Gaucher et al teaches for all parts treated, the total hardness  $\delta$ , the thickness  $\epsilon$  of the layers formed with the time unit and the friction coefficient  $f$  of the test piece were measured for each experiment, col. 6, lines 7-11. Gaucher et al therefore teaches the step of determining an effective thickness of hard oxide film to be form on the surface of titanium part. Gaucher et al teaches the treated

Art Unit: 1742

Ti parts to have oxide thickness greater than 10 microns and that friction coefficient can have a low value of 0.07, see col. 3, line 67 to col. 4, line 4 and lines 48-50.

The differences between the claims and Gaucher et al Gaucher et al does not specifically teach determining an effective surface roughness of the hard oxide film and engine valve treated by the claimed surface treating.


Since it is known in the coating art that surface roughness relates to friction coefficient and that lower surface roughness improves friction coefficient, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Gaucher et al so that a determination of the surface roughness of hard oxide layer be made to obtain oxide layer that is non-pulverous. It would also have been obvious to one of ordinary skill in the art at the time the invention was made that engine valve formed of Ti or Ti alloy be treated by the method taught by Gaucher et al. since engine valves must withstand the abrasion resulting from the friction with the valve seat. Determination of an optimum or preferred thickness and surface roughness of the hard oxide layer to be formed on engine valve made of Ti alloy to provide optimum abrasion resistance employing the method taught by Gaucher et al is within the level of ordinary skill in the art and would have been obvious.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoclan T. Mai whose telephone number is (571) 272-1246. The examiner can normally be reached on 9:30-6:00 PM Monday-Friday.

Art Unit: 1742

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Ngoclan T. Mai  
Primary Examiner  
Art Unit 1742

n.m.